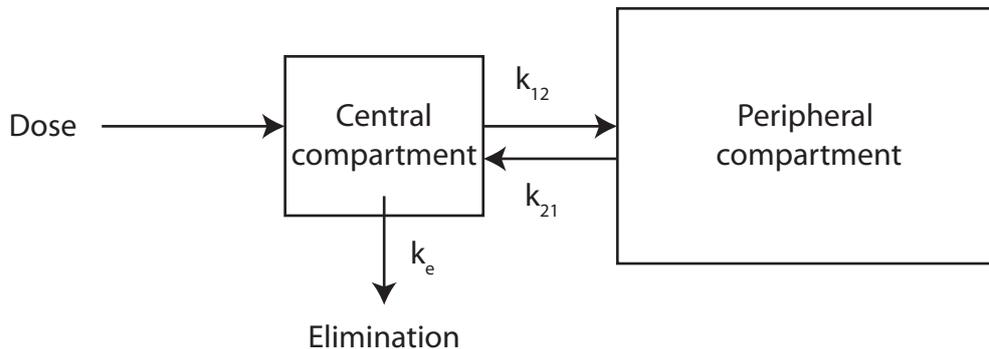


What is meant by the term two compartment model in pharmacokinetics? Use propofol as an example in explanation

A model is a theoretical construct which is used to simplify a concept, a set of variables and the relationships between these variables.

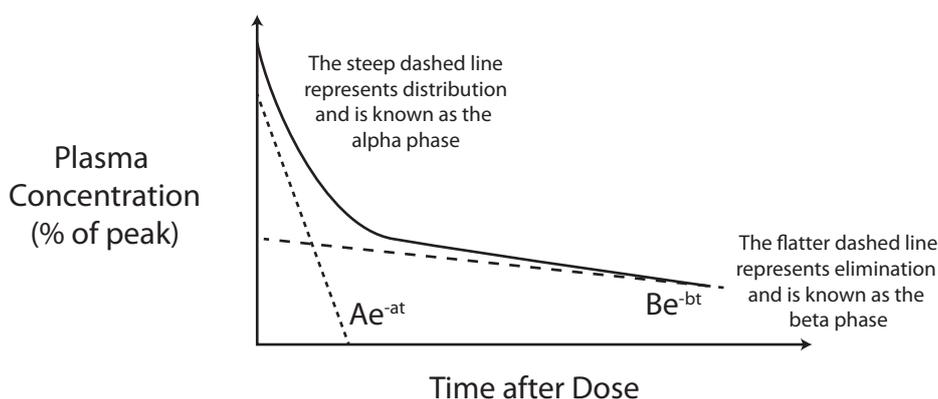
In pharmacokinetics models are used to explain the observed effect (data).

In a two compartment model a drug is injected directly into the intravascular space (central compartment) and then distributes to a peripheral compartment. The drug then returns to the central compartment where it is cleared.



Propofol is highly protein bound and lipid soluble. When it is injected IV it rapidly redistributes throughout the body. It then slowly returns to the plasma compartment and is eliminated via hepatic metabolism to water soluble sulfates and glucuronides. This can be explained using a two compartment model,

The data recorded for plasma concentrations over time is recorded and the various rate constants can be derived mathematically. This may also be demonstrated graphically in terms of plasma concentration and time.



Observed plasma concentration is approximated by $Ae^{-at} + Be^{-bt}$

The use of a two compartment model explains why we observe a biphasic half time with respect to propofol. The initial distribution phase of 4 minutes followed by a more prolonged elimination half life.

A more complex model would explain the data better, and it should be noted that most infusions of propofol are actually based on a three compartment model.